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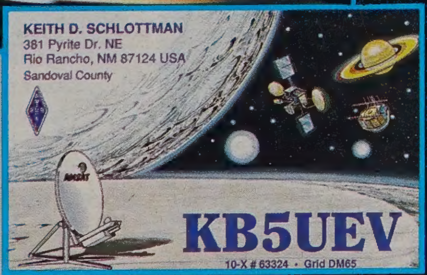
The Amateur Radio COMMUNICATOR

MARCH/APRIL 1993

FOR THE NOVICE AND TECHNICIAN AMATEUR

Volume 3 Number 2

- *RF And Audio Cables*
- *Transmitter Hunting*
- *QSLing*
- *CTCSS/Decoding*
- *Whistlers*



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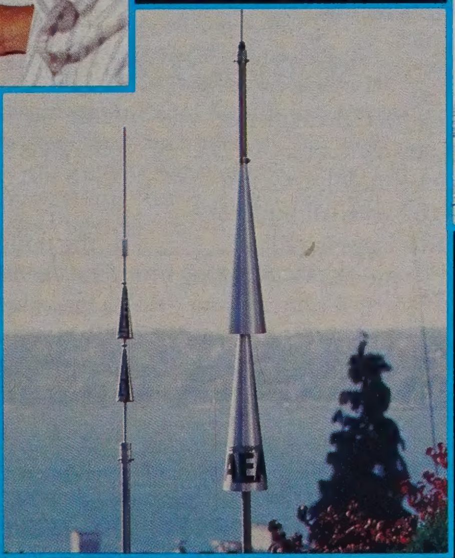

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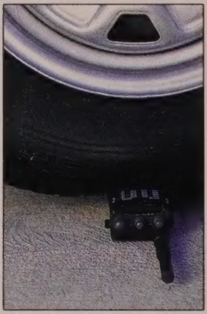

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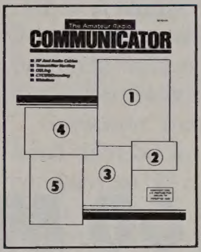

Pictured on our cover are just a few of the exciting facets of Amateur Radio. 1. A base station by Kenwood. 2. A QSL card by Rusprint. 3. Isopole antennas by Advanced Electronic Applications. 4. Rick Littlefield, K1BQT, at his MFJ QRP station. 5. A mobile transceiver by SGC.

The Amateur Radio Communicator

The Amateur Radio Communicator is published bi-monthly and is the official journal of the National Amateur Radio Association (NARA), P.O. Box 598, Redmond, WA 98073-0598.

The National Amateur Radio Association is incorporated in the State of Washington and is a non-profit organization as defined in Section 501(c)(3) of the Internal Revenue Service Code.

Organization Goals

The broad goal of NARA is to publicize Amateur Radio and to encourage people to become Amateurs by earning an entry level Novice or Technician Class license.

The organization has five specific goals within this broad framework. These are to a) publicize Amateur Radio to the general public, b) attract young people to the Amateur Radio Service, c) increase the stature and benefits of the Novice and Technician Class licenses, d) represent the interests of Novice and Technician Class Amateurs at the national level and e) make all Amateurs aware that our radio frequencies are in jeopardy from commercial interests. More specifically:

A. NARA advertises in various consumer publications to create public awareness of the Amateur Radio Service.

B. NARA is interested in encouraging young people to join our fraternity. A core of young people insures growth of the Amateur Radio Service.

C. NARA believes that the Novice and Technician classes are important and respected entry level licenses into the Amateur Radio fraternity. We are committed to increasing its benefits and stature in the Amateur Radio community.

D. NARA is committed to representing the interests of all Novice and Technician Class Amateurs at the national level. We continue to review information from the Federal Communications Commission and submit material to them with the Novice and Technician perspective in mind.

E. Finally, NARA is very concerned that confiscation of frequencies assigned to the Amateur Radio Service will continue. NARA is committed to obtaining new spectrum for the continued growth in numbers of Novice and Technician Class Amateurs.

Membership and Subscriptions

Those joining NARA receive a subscription to *The Amateur Radio Communicator* for one year. The combined cost of membership and magazine is $10.00 per year in all areas with a U.S. ZIP code.

The NARA membership and subscription to *The Amateur Radio Communicator* cannot be separated.

It is not necessary to hold an Amateur Radio license to become a member of the National Amateur Radio Association. The only "qualification" is an interest in radio communications.

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Editor/Publisher	Donald L. Stoner, W6TNS
Vice President	Bill Everett, K7RIE
General Manager	Elizabeth Tackett, N7WIQ
Marketing	George Ure, AC7X
Technical Editor	Terry Dettmann, WX7S
VHF Editor	Gordon West, WB6NOA
Technical Advisor	Dan Lewis, N7NQL
Programing	Olan Hanley, KB7GIS
Publication	Deb Davis Bundy, N7IHY
Finance	Lucy Heenan
Advertising	Karen Dixon, KA7VMP

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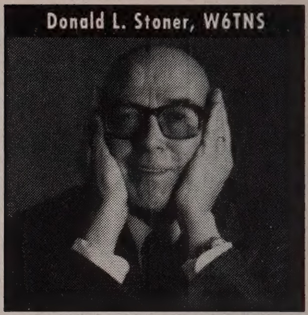

Donald L. Stoner, W6TNS

160 Meters Revisited

by Don Stoner, W6TNS

A COUPLE ISSUES ago, I floated a concept that NARA might submit to the FCC, in the form of a petition, for rules change. Basically, I suggested that Technician class Amateurs be allowed to operate *CW only*, within a very *narrow band* and with *low-power output*, on the 160-meter band.

The response was the greatest NARA has ever received on any subject and was interesting, from a number of standpoints. Initially, we were flooded with anti-NARA, anti-Stoner and anti-Technician letters. I thought to myself—"well you've done it again, Stoner, another dumb, half-baked idea." A half dozen or so writers said they were going to join NARA but had decided not to do so as the result of my insanity (ya, sure they were).

It was interesting that no NARA members cancelled their membership. Then, over the following weeks, the letters of support replaced the initial tirades, confirming the wisdom of my concept. As of early January 1993, the letters are two-to-one in favor of my idea.

Either I failed to express myself adequately or those against the concept are so anti-Technician that a "no-coder" could not explain to them how to place a stamp on an envelope. We received the usual speeches about how great CW was, how it separated the men from the boys, how CW made sure we got Amateurs with the "right stuff"—in short, the same ole bull-pucky the dinosaurs have been flinging at us since the possibility of a no-code license reared its ugly head.

Brian Ceroky, AA2LK, sent a very well-written letter telling us how great CW was and how invaluable it was to the Amateur Radio Service. He wrote, "The bottom line is this—use what you have available to you now, and find a way to make it fun! What's wrong with a code-only night on the repeater once a week? Or even a CW-only repeater!! Do Novices know how valuable their privileges are?"

> So what's the final outcome? Will we submit a petition to the FCC? In my opinion, you should stay tuned to this channel.

Brian concluded by suggesting that if I didn't agree with his views, I should "tune in CB and listen, before rebutting."

Brian, like several others, could not see the trees for the no-code forest. Why can't we Amateurs create something that is fun? Why must we only adapt what we have? I wonder what would have happened if we had listened to this argument in the early '50s when the Novice and Technician class was created? OM Ceroky's suggestion of VHF code practice was great—but why hasn't it caught on in the past 40 years? And, yes, Brian, most Novices and Technicians are very proud of their license and what it represents.

Most of the "anti-crowd" totally overlooked the basic concept, i.e. a way to make Morse code fun to learn, and a way to become skilled beyond listening to tapes or a computer. These same anti-Technician people want to see them become "real hams" by upgrading to a class requiring Morse. We have the same goal yet they frothed at the mouth with the idea of giving Techs any more privileges.

Interestingly, not one writer gave us the "camel and the tent" analogy or the idea it represents. You know the saying, "Let the camel get his nose in and he will take over the whole tent." Maybe the anti-no-coders don'trealize the "tent" is controlled by the FCC. If the Commission wants the camel in, it will happen. But if they do not, as reflected by the wishes of the majority of Amateurs, there is no way to stuff the camel inside.

Another well-written letter was received from Burt Rooke, KB7PSX, explaining to us how easy it was to learn Morse. Then he mentioned that he had learned in the Navy. Sure it's easy there. You are required to learn it and your rank is based on knowing it. Sorry Burt, it's not quite so easy for the professional people who work hard all day, the school kid who drags in a pile of homework, or the lady who is trying to juggle a career and raise a family at the same time. Burt did suggest code classes in ham clubs. It's a great idea and I support it. Unfortunately, it has never caught on except for spots here and there.

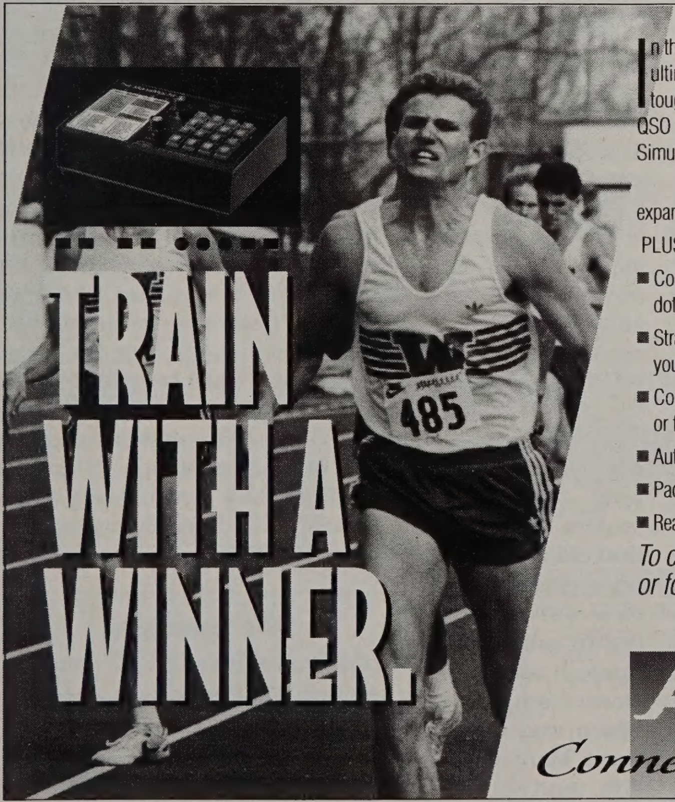
Dr. William Hall, N1KZE, wrote "I am a new ham and planning to operate on HF as soon as I can pass the code. Several friends have told me that CW practice with a wider group would have been very helpful in upgrading." Bill's friends are correct. Richard High told us on Prodigy, "The club station at UZ1AWO in St. Petersburg, Russia, trains kids using Soviet built 160-meter transceivers. They are five-watt solid state and pretty nice. I didn't realize until the last day I was there I could buy one for about $10 US (I sure would like to have one- editor). In a classroom setting they put the kids "on the air" as though they were in a contest. The rigs were all connected to dummy loads. The object was to make as many contacts as possible with the others (up to 16) in the room. Talk about QRM!" Talk about great ideas! What a great idea for clubs to help beginners wire a kit, then learn to use them on a dummy load, compete in a contest, then finally turn them lose on the air!

Michael A. Czuhajewski, WA8MCQ, liked my idea but nitpicked the use of power input versus power output. I did not express myself sufficiently to mention the generic 160-meter rig would have a built an antenna coupler optimized for a 50-foot wire. It's not too easy to measure power output on the high impedance side of an antenna coupler. The purpose of specifying a 12-volt, 500-mA wall-mounted transformer is that the power input (or output, for that matter) would be limited to what ever the power transformer could supply.

By the way, five watts into a 50-foot wire, will have a range of about 10-12 miles on 160 meters. I know, I did it. This little CW transceiver is not intended as a DX machine but, rather, a simple inexpensive rig that permits the user to contact and practice code with school, scout, church and other friends in any given area.

Someone mentioned cheating—don't do it because cheaters will use commercial HF rigs. I suppose there's not much one can do if someone throttles a Kenwood or whatever down to five watts. But just let the person crank up the power and he or she will stand out like a sore thumb. Just because some people will cheat is no reason to reject a concept. If it were, we would have no stop signs on our streets.

Jim Rinehart, WB9CEP, rejected the idea because "it is very hard to build an antenna for 160 meters that works very well. A dipole is very large and would need to be up at least 100 feet to work." I'm not sure how you define "very well." My 50-foot-short wire (that's like a long wire antenna, only it's short!) was strung in the



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trees in my back yard. To me 10 miles was very satisfactory.

Jim, and a number of others, suggested code practice on the VHF bands that the Technician is allowed to operate. Some suggested making a modulated CW (MCW) adapter for their rig. Virtually 99 out of 100 Technicians own a two-meter handheld, not a mobile or base station rig. In 40 years, I have yet to see an article on how to practice code on VHF or how to build an adapter. There must have been something, at one time or another, but the idea sure has not caught on. Why not? For one thing, it would not be commercially viable. New hams, for the most part, don't have a soldering iron or know how to solder so they cannot install a mike connector on a cable. Manufacturers of VHF gear have never standardized mike connectors. As a result, the manufacturer of a VHF-MCW adapter supplies an assortment of cables that the dealer must stock. Typical cables, such as for digital TNCs, cost about $35 each! Add this to the cost of the adapter and one gets very close to the $75-100 price of the generic 160-meter rig.

No one has shown how a VHF code-practice transceiver, that features at least 20 channels, can be made for $75-100. If someone knows how to do it, I'd sure like to hear about it and NARA would support its use.

So what's the final outcome? Will we submit a petition to the FCC? In my opinion, you should stay tuned to this channel.

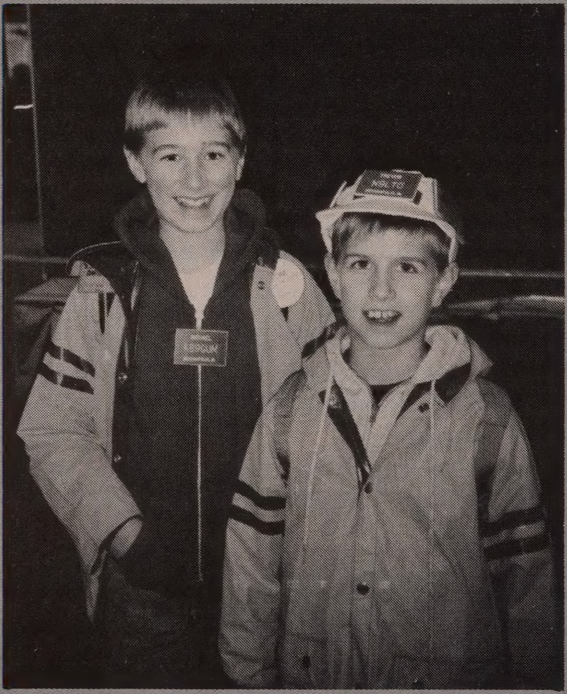
One last comment—and on an entirely different subject—I owe some of you an apology. A few editorials ago, I mentioned that NARA supported the idea of bringing all Novice testing under the wing of the VEC system. I stated that cheating was occurring in the two-volunteer testing program. I think I used the word "rampant," which was ill-advised. Many readers, and a few NARA members, thought I was speaking about them in an accusatory manner. They were quick to defend the test they had given to their son or daughter.

Actually, when the FCC first proposed consolidating testing under the VEC program, it was they who used cheating as the reason for the change. I didn't make it up. But they also didn't use the word "rampant" and I have no idea how extensive the cheating is that the Commission complains about. Be that as it may, if anyone was offended by my phrasing of the FCC position, I certainly apologize.

73 Don, W6TNS ☐

THE FUTURE OF OUR HOBBY

Those smiles certainly warm up the page! The Fulk brothers stopped by the NARA booth at Dayton 1992 to look at our training material (yes, it was raining that day!) Michael, KB9GUM, is 13 and Trevor, N9LTO, is 11. They come from a ham family—Mom is Jocelynne, N9LTR, and Dad is Donald, KB9EQC.



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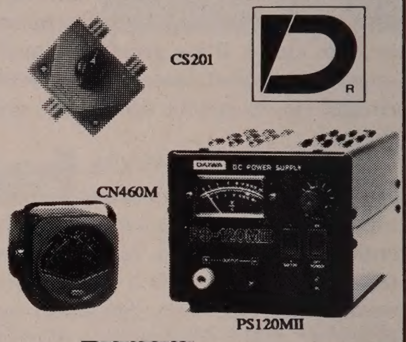

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We Apologize

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QSLing—What's All The FUSS?

by NARA Staff

QSLING? "WHY should I bother?" "QSL cards? What a pain!" "Confirmations of contacts? I've got better things to do!"

To the Amateur Radio newcomer, these comments might at first seem valid enough. At the very least, they cause you to wonder aloud, "Say, what *is* all the fuss, anyway?" Good question; let's try to bring things into focus!

To do just that, let's first define the term QSL. It can be a noun; it can certainly also be a verb. As in, "I desperately need your QSL, please QSL!" As for the former usage it most often manifests itself in the guise of the standard 3 1/2" X 5 1/2" card, containing all kinds of useful information. Each portion, hopefully, relates in some fashion to the Amateur Radio contact itself, which it is in fact verifying. It may also provide some interesting data on the Amateur Radio operator, their equipment, and perhaps other interests. While we fail to understand how an Amateur Radio operator could possibly find *time* for other interests, we begrudgingly admit that it *is* a possibility! And those interests frequently show up on QSL cards from all over the world.

And then there's the verb, "QSL." Quite often, you'll hear someone lamenting (pleading?) toward the end of an on-the-air contact, along the lines of "I've *really* enjoyed chatting with you, and getting to know you, but *please*, would you be willing to QSL?" **This happens all the time, and you should plan on it.**

A Final Courtesy—Traditionally, among Amateur Radio operators, the act of QSLing represents *the final courtesy* of a treasured contact on Amateur Radio frequencies. Alas, it may well turn out to be that the QSL card itself is valued somewhat more than getting to know the person over the air! And, while lamentable on the surface, there are *many* good reasons why the collection of QSL cards, unfortunately, in fact sometimes proves to be more worthwhile. Let's discuss some of those reasons now.

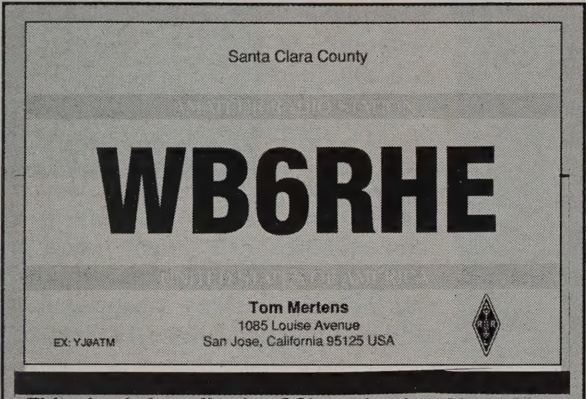
> But it's not just the new folks that enjoy the chase for enough QSL cards to wallpaper the whole house. The old-timers often find themselves playing that sort of enjoyable game.

THE WHYS AND WHAT-FORS

As it turns out, there are two major reasons—and at least one minor one—for striving towards the largest collection of QSL cards possible. First, as hinted at above, QSL cards truly represent mementos of on-the-air contacts, particularly for newcomers to the Amateur Radio Service. Indeed, many of the most recently-licensed Amateurs feel the need for QSLing *all* of their contacts, presumably in the hope that the other guy will reciprocate. And there are ways to substantially raise the likelihood that he *will*; we'll get into that shortly. But it's not just the new folks that enjoy the chase for enough QSL cards to wallpaper the whole house. The old-timers often find themselves playing that sort of enjoyable game, themselves. I know one fellow who has been licensed for just over 20 years now who doesn't really *need* any more "wallpaper" but who does enjoy trying all the new modes that Amateur Radio has to offer. And, immediately after experiencing the excitement of packet radio, Pactor, Amtor, and—most recently— CLOVER, he simply can't *sleep* well at night until he's bagged a confirmation of that first new-mode contact from the guy or gal on the other end.

The second major reason for pursuing the almighty, sometimes elusive, QSL card is for the purpose of obtaining enough cards to qualify for one or more (usually more) Amateur Radio awards. Now, just to put things into perspective here for a second, try to understand that there have been whole *books* written on the various hundreds of awards, certificates, plaques, pins, coffee cups, and other treasures that constitute the many Amateur Radio awards programs that are available! To say that striving for awards is an inherent Amateur Radio pastime is something of a major understatement in itself.

And of course, the QSL card is most often the means whereby



Santa Clara County

WB6RHE

Tom Mertens
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EX: YJ8ATM

This simple but effective QSL card, printed by Rusprint, provides all the information necessary to confirm a contact. It even provides the county for the County Hunters Award.

Amateurs provide proof of having made the necessary Amateur Radio contacts. Let's take some brief examples to illustrate, bearing in mind that a NARA article on QSLing for awards is in the works at the very moment you're reading this.

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Two of the more popular awards involve working (and obtaining QSL cards for) all fifty states, *or* all six continents. Several Amateur Radio organizations promote awards that relate to these two types of activities, but in virtually all cases, it's the QSL cards themselves that are required to bag the prizes.

But, even with the *Worked All States* award, things become more interesting, as you examine the criteria for obtaining it. For example, just when you thought that 50 cards would do the trick, you suddenly spot the fact that there's *another* rendition that involves working (and QSLing, of course) fifty states—on each of five different bands. Egads! Suddenly we're talking about not fifty, but potentially two *hundred* and fifty cards. At this point, you're likely to become quite clear on why Amateurs are sometimes a bit fanatic about QSLing **every** contact...

Things are certainly not always that complicated. As mentioned earlier, six cards—one for contacts with each continent (Africa, Asia, Europe, North America, South America, and Oceana)—are all that's required to snag the International Amateur Radio Union's prestigious *Worked All Continents* award. "But, gee, I've only got a Technician class Amateur Radio license. It's hard for me to get out of my back *yard* radio-wise, never mind working Africa!" Not so. In fact—in case you haven't noticed—today's Amateur Radio Service allows people with *any* class of license to avail themselves of numerous Amateur Radio satellites, and even digital networks, at no charge for their use, thus enabling you, the beginner, the exciting opportunity to make international radio contact. And NARA's *Amateur Radio Communicator* magazine has (and will continue to) spotlight downright thrilling and simple means for you the newcomer to do just that. Stay tuned!

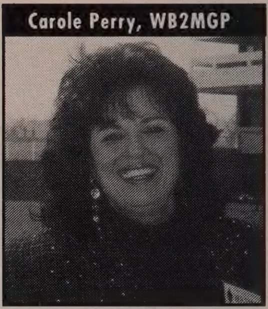
Finally, there's the third reason for collecting cards, that was previously labelled a minor reason, earlier in this article. A lot of Amateurs would argue the point, while correctly reminding us that the sheer beauty of many cards—properly framed or otherwise mounted on your Amateur Radio shack's wall—does constitute a *major* reason. OK, let's not quarrel or debate; the point's well taken in advance—there are some Amateurs around the world (many, actually) who go absolutely overboard in their efforts to provide the most **gorgeous** QSL cards you could ever imagine. The Amateurs of one country in particular—Japan—are known for exquisite taste in the design and printing of their QSL cards.

Let's get back to the content of the cards themselves for a moment. By now, you're probably wondering what specific data the QSLs should have to be most effective, and to insure the greatest return rate. Fair enough; let's dig into the actual content of a typical QSL card.

DXers, operating on the high-frequency bands, can get QSLs from all over the world. These cards, from QRPer Dave Ingram, K4TWJ. are for confirmation of contacts using less than five watts power output.

To start with, because a number of the various Amateur Radio awards seem to have zeroed in on certain seemingly pre-determined statistics,

(Continued on page 22)


Carole Perry, WB2MGP

Funding Can Be Fun

by Carole Perry, WB2MGP

IF YOU ARE A TEACHER who includes Amateur Radio in his or her curriculum, sooner or later your need for equipment and supplies will exceed your allotted school budget. In the past 12 years of teaching "Introduction to Amateur Radio" to 6th, 7th, and 8th graders at Intermediate School 72 in Staten Island, New York, I have found that it is best to include the children in the decision making process of how to raise funds for their program.

The youngsters really enjoy getting involved with the activities and are very creative in their suggestions. Here are some tips on fund raising that have proven to be very successful for us. The first thing for the teacher of Amateur Radio in a school to do is to make your presence known to the local ham radio clubs. Most hams will be glad to help out with their time, expertise, and donations once they are aware of your efforts with kids. You will be amazed at how many club members will come forward with gear or telegraph keys that have been buried in an attic or basement just waiting to surface for a good cause. The clubs can also steer you toward the local hamfests and flea markets for good buys on used equipment.

A cake sale has always been a lucrative project for us. The parents are extremely supportive about donating home-baked cookies and cakes. Be sure to keep the parents apprised of your radio activities during the term, so that they can appreciate the value of your work with their children. I also have learned to coordinate with the home economics teacher who works with the children in baking goodies to donate to the cake sale. It's a good idea to include your colleagues in any extra-curricular activity in a school. For weeks ahead of time, the children in my class are busy in their art classes, making posters to advertise the cake sale.

Carole, WB2MGP, pointing out the location of a DX contact to Ken (right) KB2FGB, and Aaron.

Last year one of my classes published a little newsletter that described all the local activities we were involved with; including Walk-America for the March of Dimes, local parades, and providing communications for neighborhood clean-up campaigns. The children were able to get some local merchants to purchase ads, and then they sold the newsletter for 35 cents.

The biggest money-maker of all can be a properly advertised car wash. This activity requires a great deal of preparation and organization on your part ahead of time. Appeal to the PTA of your school to help out. You will definitely require adult supervision in all facets of this fund raiser. Your school will need to provide you with the proper facilities, access to water, appropriate parking space, etc; Parents and local residents can drive their cars up to a designated area. Your ham radio students should be prepared with the proper supplies, besides their handi-talkies for communications.

The students should be ready with buckets, sponges, rags, portable car vacuums, and of course, easy access to water. Some of the children can help the adult volunteers with traffic management, while others offer assistance with collection of money. In the weeks prior to the car washing event, some students should be organized into groups handling advanced publicity such as local newspaper ads, hanging signs up all over town, and spreading the word through the community. It's a good idea to ask the local hams to volunteer their time for the occasion. Everyone has a good time at a car wash event, and the drivers will be happy to pay $2.00 to have their cars cleaned for a good cause.

> ...sooner or later your need for equipment and supplies will exceed your allotted school budget.

Carole and the kids from Staten Island's Intermediate School 72 ham shack.

I can always count on the crafts teacher in my school to help out with some of our more creative activities. Many of the children enjoy making "coded jewelry." Dental floss or thin pieces of elastic can be used in the making of beaded bracelets. I purchase large bags of little stringing beads in three different colors. One color represents a dot and the other is a dash. The third color stands for a slash mark. Youngsters can set up counters at any school event and sell the bracelets with the customer's names in Morse Code. Coordinated bracelets and necklaces make lovely gifts around the holiday season or for Mother's Day.

When planning your fund raisers for the school term, be sure to include as much outside help as possible. Most importantly, be sure to get input from your own students. Working together for a common goal is all part of what hams are about anyway.

If you've had a particularly successful event to raise money, be sure to write me about it, so we can highlight your group's efforts. I'm also always interested in hearing from children who are enthusiastic ham radio operators who would be interested in speaking at youth forums at national conventions. Please forward my address to any young ham you may know who would like to participate. PO Box 131646 Staten Island, NY 10313-0006, #718-983-1416.

73 from Carol, WB2MGP ❑

HOT TIPS

Newcomers—one of the best deals going at swap meets, is older channelized two-meter radios. You can buy nice working units for $50 or less! If you want to operate on one or two specific repeater operations, all you need to do is plug in new crystals.

But where do you get new "rocks" at low cost and fast service. At NARA we've had excellent luck with a company in Southern California. It is **M H Electronics, 9569 Ninth St., PO Box 652, Rancho Cucamonga, CA 91730. Their phone is 714-989-1976.** Ask for Mel Hammer or his son.

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THE ADVENTURES OF

Dan & Burke

A Hot Idea!!

The March wind spanked Dan with the slamming basement door as he stepped into the electronic laboratory of his friend, Burke. The latter was sitting with his head in a pair of muff-type earphones connected to an amplifier with a variable frequency audio oscillator connected to its input. As Dan looked at his chum aimlessly adjusting the frequency of the oscillator and the gain of the amplifier, he decided there was something about Burke's appearance that was not right. There was a certain lackluster look about his eyes, and his round face looked fatter than ever—but in a sort of lopsided way.

"Guess I'm the one guy in ten for whom it won't work," Burke said with a sigh as he shut off the equipment and removed the earphones.

"What won't work, and what's the matter with your face? It looks twice as big as it ought to."

"The 'audio anesthetic' won't work for me. I've got an infected wisdom tooth that's killing me, and I have an appointment with the dentist in an hour. But the other day I read that a Boston dentist discovered that music or random noise put into earphones worn by a patient killed the pain of dental work in 90% of 2000 cases tested. The patient adjusts the sound level with a gain control in his lap until the sound blocks out the pain sensation. A company in Rochester is already in production on the device. I was trying to see if I could kill the pain of my toothache with various frequencies from the audio generator, but I couldn't."

"That thing must work on a variation of the 'mule skinner' principle," Dan said. "You know a veteran mule skinner always took the ear of a mean mule between his teeth and bit down hard while he was putting on the bridle. The idea was that while the mule was thinking about how much his ear hurt he couldn't think about kicking or biting the mule skinner. With the audio anesthetic, while the mind is concentrating on the sound, it ignores the pain. Your trouble is that in fooling around with ham radio, etc., you've trained yourself to be a little smarter than the mule. You can listen and still be thinking about your aching tooth at the same time. Well, I better scram and let you go to the dentist."

"Oh, no, you don't!" Burke exclaimed. "I've a little chore for you to perform while I'm gone; and I just know you wouldn't refuse your poor, pain-wracked buddy."

"Depends on what my poor, pain-wracked, scheming buddy has in mind."

"All I want you to do is mount this thermistor anemometer out on the garage and run this cable from it back into the lab."

"You know," Dan said thoughtfully, "I don't think you've got a toothache at all. You've just dislocated your jaw on one of those big words you're so fond of. What the heck is a 'Mistermometer'?"

"I said a 'thermistor anemometer.' As you know, or should know, an anemometer is a device for measuring wind velocity. This one is intended to do so by the use of thermistors. A 'thermistor' is a resistor whose resistance changes, in a nonlinear fashion, incidentally, with a change in temperature. The temperature affecting the resistance may arise externally or it may come from current flowing through the thermistor. In the case of these thermistors you see on the bench, an increase from -60 to plus 150 degrees centigrade will cause the resistance to fall from about 2000 ohms to one ohm."

"That sounds just dandy for measuring temperature, but I don't see how they can be used to measure wind velocity."

"Keep listening and you will. I've arranged two matched thermistors and two resistors—one variable—in a bridge circuit," Burke explained as he sketched the familiar diamond-shaped bridge circuit. "These two top legs are the thermistors; the two bottom legs are the resistors. Here's a battery in series with a switch connected between the common junction of the two thermistors up here and the common junction of the two resistors at the bottom. A DC meter connects from this left-hand thermistor-resistor junction across to the right-hand thermistor-resistor junction."

"Now, when the variable resistor is properly adjusted to equal the fixed resistor, the battery current divides equally between the left and right sides of the bridge. Since the same current flows through each thermistor, any resistance change in one is duplicated by the resistance change in the other, and the bridge stays in balance. Voltage drop along the two sides is identical, and no current flows through the meter."

"How do you know the thermistors in your bridge are matched?"

"Because I matched 'em. I put the bridge in the freezer where the temperature is below zero and then put it in that light-bulb-heated oven and brought the temperature up to 150 degrees. I kept repeating this test with different combinations of thermistors until I found two that would go through the temperature swing with practically no indication of current through the meter at any point. You satisfied?"

"Yep, but how does the thing measure wind velocity?"

"As you can see, one thermistor is mounted inside this aluminum can with tiny holes in the top and bottom to permit outside air to filter very slowly through. The other thermistor is mounted out in the open so wind can blow around it freely. When battery current flows through both thermistors, heating them, the heat is lost to the surrounding air. In a dead calm, the heat lost by the enclosed thermistor and the heat lost by the one outside in absolutely still air will be the same and no reading will show on the meter."

"However, when a wind is blowing, the heat from the exposed thermistor will be carried away; the harder the wind blows, the faster heat is lost. Heat lost by the enclosed thermistor in its artificial calm will remain the same. The wind-cooled thermistor will stay high in resistance while its hotter buddy inside the can will go lower in resistance, unbalancing the bridge and permitting current to flow through the meter. All we have to do is to calibrate this current-indicating meter in terms of wind miles per hour and we have a remote-indicating anemometer with no moving parts."

"I suppose this little wooden umbrella-shaped canopy is to keep the sun and rain from influencing the reading."

"Right. Actually the whole thing is pretty crude, but I want to put it up for a while and see how much rain and sun does affect it. This variable March weather is ideal for making such a study. Will you put it up?"

"Oh, I reckon," Dan said gruffly. "Quit stalling and get to the doctor."

Actually Dan was as eager as his friend to try out the new gadget, and he lost no time after Burke had gone. It took but a few moments to fasten the device securely to the garage gable and to run the four-wire TV-antenna rotor cable back into the basement through a window. There he connected two of the wires to the battery-and-switch combination, and the other two were connected to the milliammeter. When the switch was thrown, the meter indicated up-scale; and Dan was fascinated by the way the meter reading kept step with the roar of the March wind outside. He was still watching the meter when Burke came in the door.

"You're still kind of fat in the face," Dan remarked critically, "but you look better. Could he save the tooth?"

"He can if he wants to; I left it with him," Burke replied breezily. "He yanked it out, and it didn't hurt a bit."

"Just wait until that dope he shot you with starts dying out," Dan said with the voice of experience. "Your gadget is working fine, Burke. Watch how the meter pointer moves up every time the wind bends the tops of those trees through the window there. Hey, that's funny," he broke off. "It was working swell, but look at the crazy way it's behaving now."

The meter was acting strangely. No longer did the pointer keep step with the roar of the wind. First it bobbed up and down the scale erratically and then began backing off scale below zero. Finally it settled firmly against the left-hand stop and refused to budge until Dan opened the switch; then it rested on zero.

"Something's gone wrong out there. You stay here and watch the meter while I go have a look," Dan suggested.

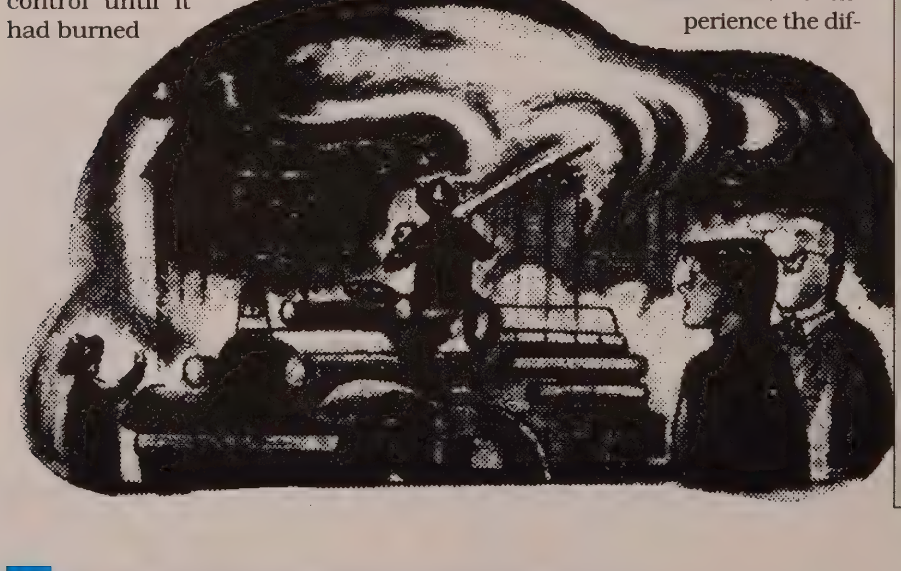
He had hardly reached the top of the outside basement stairs when he began shouting: "Call 911! Call 911! Kreuger's barn across the alley is on fire, and is it ever going!"

Burke rushed upstairs and mashed the three keys. He explained the situation to the emergency operator, and then ran out in the back yard. By this time the old two-story frame barn across the alley was a mass of flames; and blazing shingles were sailing all around. Long tongues of flame reached across and licked at Burke's garage.

The fire department came roaring up and started playing water on the burning barn and the other buildings nearby, but the fire was not put under control until it had burned the high tension wires overhead in two.

"Boys, that was close," the fire chief said to Dan and Burke. "If the thing had had ten minutes more start with this wind, that whole row of garages could easily have gone up in smoke. It certainly is a good thing you spotted it when you did. How did you happen to see it?"

"Well, we were kind of tipped off by a sort of fire detector we had installed on our garage roof," Burke explained lamely. He knew from bitter experience the difficulty of trying to describe the working of electronic equipment to people without an electronic background.



"Actually it's not hard to figure what happened," he said to Dan after the chief had gone and the two boys were walking back to their laboratory. "The wind was blowing right from the fire toward our garage. When a tongue of flame would lick over and slu-u-urp that exposed thermistor, the can would protect the enclosed thermistor from the quick increase in temperature. As a result, the exposed thermistor got hotter than the enclosed one, and this made the meter read backward."

"QSL, old buddy," Dan said as he laid an affectionate arm across his friend's shoulders, "the thing I like about you as an inventor is that you always invent something. Of course, you may set out to invent a thermistor anemometer and end up with a jim-dandy fire detector; but, by golly, you come up with something! Man, you're the most!"

"Thanks, pal—I think!" Burke answered as he grinned crookedly up with his still swollen face at his friend.

Dan and Burke is based on a storyline created in 1954 by John Frye, W9EGV. The boys are the sons of John's original characters, Carl and Jerry.

John Frye is no longer with us. But while he was alive, John was an avid Amateur Radio operator who wrote about young people—for young people.

It's doubtful that anyone could make John's stories more interesting or improve on his words. We'll settle for giving them a 1990s twist.

If you would like to learn more about becoming an Amateur, or helping a young person become an Amateur, write to the National Amateur Radio Association, PO Box 598, Redmond, WA 98073-0598 or call #1-800-468-2426.

Working With RF And Audio Cables

by NARA Staff

RF-Shielded cable, whether used in RF or audio work, always presents a problem to the newcomer. Stripping and removing parts of the braid are not easy, and occasionally small strands of braid short out the cable. A good technique is as follows:

If an outer layer of insulation is used, remove a portion by running a sharp knife around the cable, flexing it slightly to break the insulation loose. Then, make a light cut from this point to the end of the cable and peel off the insulation. The end of the coax should look like that shown in *Figure 1A*. Use a light touch—too much pressure on the knife may nick the braid.

Loosen the braid with the fingers and push it back so that a flat ring is formed as shown in *Figure 1B*. Using diagonal cutters, clip the outer edges of the flat ring (C), thus separating the braid. Remove the excess braid and strip a portion of the insulation from the inner conductor as shown in *Figure 1D*.

Audio—Small diameter shielded cables, such as microphone cable, as well as small sizes of RF coaxial cable, may be terminated in a professional way by using the method shown in *Figure 2*.

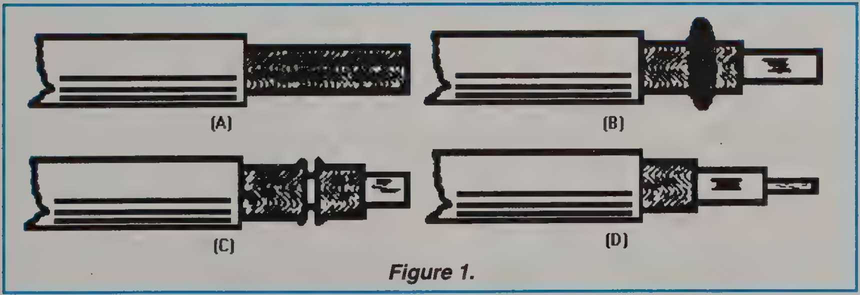


Figure 1.

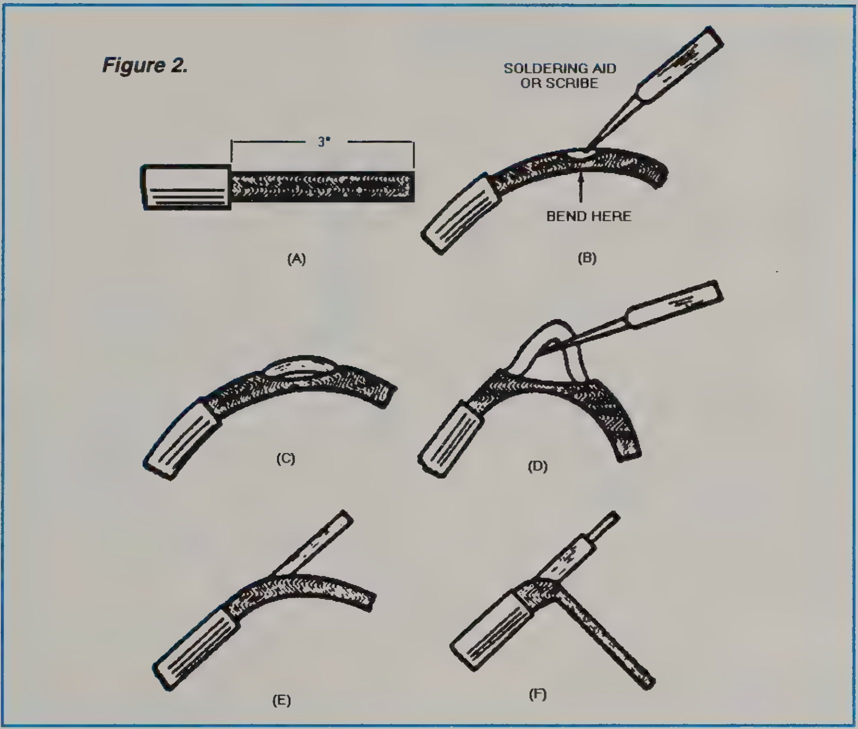


Figure 2.

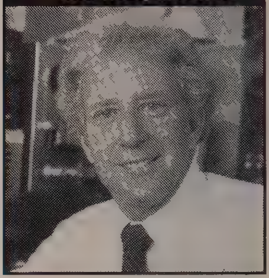
If the cable has an outer insulator, remove about three inches of this material as shown in (A) thus exposing the braid. Next, push the braid back to loosen it and bend the cable slightly. With a soldering aid, a scribe, or a small nail start working the strands of the braid apart to form a small hole as shown in (B). Keep working on the opening and bending the cable until you can get the tool under the inner conductor (C). Now slip your tool under the inner conductor and pull the free end out of the hole in the braid (D). Hold the edges of the braid back with the fingernail, if necessary, while performing the operation.

With the inner conductor free of the braid, stretch the braid out until the opening is closed tightly around the inner conductor (E). Finally, finish the job by stripping insulation from the inner conductor and flatten the extra length of braid to form a ground strap as shown in (F).

Cables prepared in this manner are now ready to have the end connector applied.

73s from NARA Staff ❑

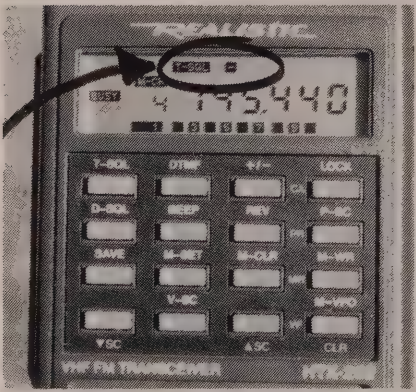
Gordon West, WB6NOA



Decode Some Quiet Listening

by Gordon West, WB6NOA

> Maybe you want quiet, not chatter, coming over your speaker while waiting for a specific call to come in.



THE AMATEUR RADIO service is a party line. Anyone may tune into your broadcast. When more than two operators carry on a conversation, it's called a *round-table.* Round tables are fun, especially if you are just getting started in ham radio. Everyone in the round table can offer advice on just about any subject that may come up for discussion! But maybe you want quiet, not chatter, coming over your speaker while waiting for a specific call to come in.

One of the fringe benefits of Amateur Radio is **selective signaling.** If you have a 2-meter or dual-band mobile or handheld transceiver, it probably already has several different forms of selective signaling built in. If you operate an older VHF or UHF set, selective-signaling tone boards are probably available as a relatively inexpensive option.

CTCSS—Continuous Tone-Coded Squelch System is the most common form of selective signaling, and it's built into all newer radios for encode. CTCSS, sometimes called tone squelch or private line, a trademark of Motorola, is an almost inaudible *low-frequency audio tone* that rides along your FM carrier. You can sometimes hear it on a base station receiver as a slight hum on the incoming signal.

CTCSS unlocks certain repeaters requiring sub-audible tone access. Many repeater operators require a tone to turn on their system in order to keep it from false-activating from stray RF up at the repeater site. If the tone is published, such as in a repeater directory, the repeater is considered *open* for anyone to use. However, if the CTCSS tone frequency is unpublished, and the repeater directory lists the repeater as *closed,* you must first join the system in order to find out what the tone frequency is, and help support the repeater system by joining the organization formally.

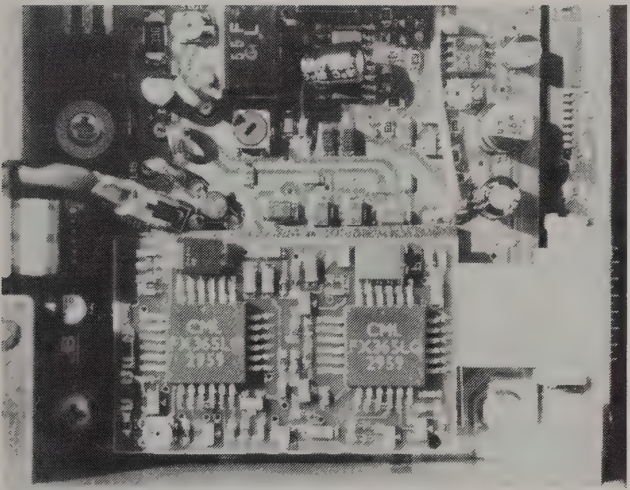
There are approximately 41 different sub-audible tones, each tone assigned a Motorola tone code. For instance, the popular tone 103.5 Hz is sometimes referred to as "PL-1A." Look at the following chart and see whether or not you can figure out what the exact tone frequency is for "PL-4Z." Got it? It is 136.5 Hz.

Another handy use for CTCSS is to intercommunicate with a friend on simplex, and both of your sets remain absolutely silent until the other station with the precise tone comes on. Instead of hearing the general party line, the only signal you will hear will be from another operator who has encoded your particular sub-audible tone frequency. This works only if your mobile or handheld transceiver has capabilities for not only tone encode, but also tone decode. Check with your friend or an Amateur Radio dealer and see whether or not your unit has decode capabilities. Cycle through the "tone-set" function on your radio, and if all of a sudden the speaker instantly mutes (silences), then you know you have a tone decode capability built into your tone encode circuit.

A word of caution—always make sure to check the frequency by temporarily deactivating your tone decode in order to make sure you don't accidentally transmit over a conversation already going on. Some little handhelds have a squelch button that lets you momentarily sample a channel, in the decode mode, for any activity. If the channel is clear, make your call. What your friend will hear, on decode, is your voice coming through loud and clear, and no one else.

Paging—An advanced feature in some handheld and mobile VHF/UHF sets is **tone paging**. This is accomplished by entering selected keypad numbers that will send out a dual tone similar to your home telephone (technically called *DTMF—dual-tone multi-function*). If you transmit and punch in the proper numbers, your friend's radio will beep like a pager, and they know that you are trying to place a call directed to them. If you set up the tones as part of a system, you may call one station, 10 stations, groups of 10 stations, and all stations with just a few keystrokes. This is called single call, group call, and all-call.

If you don't have DTMF capabilities in your mobile or base station, it can be easily added with an accessory called the Silencer manufactured by Amateur Radio Engineering (206-882-2837). It plugs into the speaker jack and silences the radio until the correct DTMF signal is received.



The double-chip CTCSS board assembly in this Alinco mobile dual-band radio permits separate settings for 144 and 440 MHz.

Code	Freq.(Hz)	Code	Freq.(Hz)
XZ	67.0	4Z	136.5
XA	71.9	4A	141.3
WA	74.4	4B	146.2
XB	77.0	5Z	151.4
WB	79.7	5A	156.7
YZ	82.5	5B	162.2
YA	85.4	6Z	167.9
YB	88.5	6A	173.8
ZZ	91.5	6B	179.9
ZA	94.8	7Z	186.2
ZB	97.4	7A	192.8
1Z	100.0	M1	203.5
1A	103.5	M2	210.7
1B	107.2	M3	218.1
2Z	110.9	M4	225.7
2A	114.8	M5	233.6
2B	118.8	M6	241.8
3Z	123.0	M7	250.3
3A	127.3		
3B	131.8		

Some manufacturers call this paging system *DSC—digital selective call*. It uses the same keypad tones on transmit, but each radio requires its own procedure to put these tones into memory.

A good place to use CTCSS between ham buddies might be at a local Amateur Radio swap meet on simplex. The only time your radio will sound off is when your friends encode the same tone that you have your transceiver's decoder set to. With over 41 different possibilities, it's unlikely that you'll hear anyone else using the same tone on the same frequency.

If you are a member of a club that regularly takes part in unscheduled exercises, digital selective calling, using the paging feature of your VHF or UHF handheld or mobile unit, is another great way to keep your set silent except for a specific call.

And always remember—before transmitting, *double check that the frequency is clear* by momentarily depressing your squelch override button before making a call. Even though you don't hear anyone on decode, there still may be someone using the frequency that you have tuned to. And if you try and do tones through a repeater, double check with the repeater control operator that this is a permissible activity over their repeater system. Good luck with some features you probably didn't know your VHF or UHF radio already had built in!

73 from Gordon, WB6NOA ❑

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Amateur Radio As A Movable Feast

by G. William Forgey, K7KDU

THESE DAYS I HEAR that Amateur Radio is "just a hobby." Nothing new under the sun. No new horizons to explore. Everyone is just an appliance operator, no spark, no sense of inquiry, no *magic* anymore.

Don't you believe it. Amateur Radio isn't just *one* hobby. It can provide a lifetime of fascination with technology, technique, artistry, self-revelation, and more *fun* than people ought to be allowed to have.

I've been fooling around with "electronics" (what we used to call "radio") for so long that *I knew Don Stoner when he had hair.* And the magic never ends. Let me tell you a little about my *latest* Amateur Radio project.

All hams and SWLs know about static. Static is often caused by thunderstorms and can trash the bands, sometimes overwhelming even the best limiter or blanker. For the last few years I've been listening to static. Because those same lightning crashes also create a variety of VLF radio signals, most notably, **whistlers**.

Whistlers are *radio* signals in the audio frequency range. Generated by the electromagnetic pulse from a lightning flash, whistlers appear to the observer as a descending tone. Gliding down from the supersonic, the whistler is sometimes a relatively pure note, more often diffuse or "breathy." Often elusive, sometimes they come literally in "storms" with echo trains that seem to run on for many seconds, sometimes overlapping. Occasionally ending in a sudden rising "tail."

Whistlers are just one of the fascinating VLF radio signals generated by the earth itself. Probably first reported by Preece in 1894, whistlers were subjected to close scientific examination during IGY, the International Geophysical Year in 1957. (You older guys will remember 1957 as the year of the Sputnik.) And the scientific types determined that whistlers were actually caused when the wide-band blast of radio energy created by a lightning flash leaked out through the ionosphere into a "duct" formed by the earth's magnetic field and the ionized plasma that surrounds the earth. Since these ducts are formed by the magnetic lines of force that loop between the earth's magnetic poles, the radio path length is quite long. And, since the medium through which the radio pulse passes is a plasma, the pulse undergoes a process called dispersion, in which the various frequency components of the wide-band pulse all travel at different velocities. Usually, the higher frequencies travel faster than the low, stretching the pulse in time and creating the descending note that is the most obvious characteristic of the signal.

> Amateur Radio...can provide a lifetime of fascination with technology, technique, artistry, self-revelation and more fun than people ought to be allowed to have.

The "typical" whistler lasts about a second, peaking in the range of 5000 hertz or so. Echo trains are common, particularly in the hour or so just before local sunrise. The echo train is the result of the whistler bouncing back and forth between the North and South ends of the magnetic duct. I've heard up to about 12 echoes with my equipment, although professionals have records of literally scores of echoes from a single event.

There are many other interesting signals in the VLF range. Identified as "tweeks", "spherics", "hiss" and "dawn chorus", these signals are nearly always present in some complex mix. The trick is to hear them.

The professionals use giant loop antennas, often triangular, 80 feet or so across the bottom and 40 feet high, together with sophisticated receivers. In the past three years I've designed a variety of simple E-field receivers that I use to listen to and record the VLF spectrum. Essentially, the E-field receiver is just a whip antenna connected to an audio amplifier of highly specialized design. The audio amplifier becomes, in effect, a VLF "tuned radio frequency" receiver, converting the VLF radio energy into an audio signal capable of operating your headphones and/or your tape recorder.

Editors Note: Bill and I do go back a few eons! Even I don't remember when I had hair! I apologize for putting his article in the April issue of *The Amateur Radio Communicator*. But this is no April Fool's joke.

If you are interested in *LOWDOWN* from the Longwave Club of America, write to the publisher, Bill Oliver, 45 Wildflower Rd., Pevittown, PA 19057

The *WHISTLER HUNTER'S GUIDE* (monograph) and *INTRODUCTION TO NATURAL RADIO* (cassette tape) is available from Michael Mideke, Box 123, San Simeon, CA 93452. Mike's monograph and tape are both available for $16.00, postpaid.

Finally, you can reach Bill Forgey at 6526-183rd Pl. SW, Lynnwood, WA 98037.

There are a few complications. The harmonics of the 60-hertz power distribution system created by light dimmers, switch-mode power supplies, variable-speed drills, etc. . . generally guarantee that you won't hear anything until you leave the power grid behind. But you needed a camping trip in the mountains anyway, right? Trouble is, around where I live the giant 24.8 kHz signal from the Jim Creek transmitter up by Arlington, Washington, will follow you out into the woods. *Big time!* Expect a signal measured in dozens, sometimes hundreds of millivolts if you venture out in the North Puget Sound area.

So, what to do? The MK Ill Whistler Receiver works pretty well for me. Copies have proven their worth in various other locations, most notably that of Mike Mideke, the West Coast VLF guru. His address appears adjacent and, should you be at all interested in whistlers, you should send for Mike's monograph on the subject. Get the tape too. You will find it absolutely fascinating and it will serve as a roadmap into the bizarre world of *Whistlers and Related Ionospheric Phenomenal.* If you are interested in building a copy of the MK Ill Whistler Receiver, send me a self-addressed, stamped envelope at my address shown adjacent and I will be happy to provide you with photocopies of the schematic diagram, the PC layout and a short article that was recently featured in the *LOWDOWN*, a magazine for VLF experimenters.

In the nearly 40 years I've held a license, I've chased some DX on six meters, built CW, AM and SSB equipment, assembled microwave gear and played around with radio astronomy. And now this whistler thing. Like I said, Amateur Radio isn't just a hobby. If you follow where your interests lead you, you just can't help but learn something. About physics, about engineering, about the art of design, even about yourself. And have a *lot* of fun.

73, de K7KDU ❑

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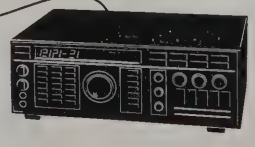

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Stacey Hornback, KD6NQE

An Introduction To Transmitter Hunting

by Stacey Hornback, KD6NQE

EVEN BEFORE I had my license, I was participating in radio-related activities. My interest zeroed in on transmitter hunting, or fox hunting, T-hunting, or whatever it is called in your neck of the woods. I'll use the term **T-hunt** in this series of articles on how to find the wile fox.

If you've never been on a T-hunt, I have one bit of advice for you: **GO FOR IT!** T-hunts are incredibly fun, not to mention educational. I learned a lot of radio-related theory before I ever started studying for the FCC ham radio exams, and I learn more with each hunt I participate in. T-hunting is definitely my favorite radio pastime.

If you are not part of a radio club or Amateur organization, you might not meet many other hams in person. T-hunting is a great way to bring lots of local hams out of the woodwork. You would be surprised how many people start turning up for T-hunts once they get started. Even if your spouse and children are not very interested in Amateur Radio, they'll still enjoy T-hunting because it's more like *a game and social event*, rather than a technical affair.

Getting Started—If you don't know much about T-hunts, let me fill you in. It's basically a radio version of hide-and-seek. The fox, or "it," hides with his or her radio, and by following the transmitted signal, all the hunters try to find it. That's the basic hunt, anyway. There are all sorts of variations. Some foxes have transmitter boxes that they can hide, and then you have to find the actual antenna in order to win. These hunts are a lot harder. With just a small box to hide, there are all sorts of possibilities, depending on the fox's creativity. The transmitter can be buried underground, hidden in bushes—almost anything.

T-hunts are incredibly fun, not to mention educational.

A few months ago, Marty, N6ZAV, hid the T-box in a baby stroller, put on a hat and a fake mustache, and pushed the stroller around a large parking lot. He had a couple things going for him that made that hunt particularly tough. First of all, the hidden transmitter was *mobile*, and a moving signal is noticeably harder to follow. Secondly, do you really want to walk up to a strange man with a baby and "sniff" the stroller with your radio gear? You had to be pretty darn sure that was really the source before you went poking around this "baby."

Different radio clubs and organizations sponsor hunts, and they're each run a little differently. Sometimes there will be a fixed location, where all the hunters start from the same place. Some hunts give points based on the time and mileage it takes you to find the transmitter. The big concern on timed-only hunts is that some people get a little carried away with their driving in the frenzy to get to the transmitter first. Of course, no responsible organization wants to encourage recklessness. From my experience, it seems like most hunters enjoy the timed-only hunts best.

Radio direction finding, or *RDF*, has been around for many years. As fun as competitive hunting is, there are a lot of practical applications for the skills required as well. RDF techniques help in search and rescue efforts, if a plane or boat is lost/missing. The FCC, ARRL, and radio clubs find it useful in finding the source of all sorts of interference, malicious or otherwise. In wartime, the military has used RDF to keep track of various activities. RDF techniques are in use all the time, whether you know it or not.

However, I'm here to tell you about competitive hunting using Amateur Radio. I'm lucky to live in southern California, one of the more active T-hunting areas. There are hunts going on here all the time. I estimate there is at least one hunt—often more—every week, and there are hunts for every level of experience. Some are really dedicated to the beginning hunter, and some are just vicious, no-holds-barred, anything-goes hunts.

Depending on where you live, you may not be quite as fortunate as I am in having that many available hunts. However, if you can get a few of your local ham friends interested in an innocent game of hide-and-seek, it won't take long before you're all completely hooked. I hope to be able to give everybody a few tips on getting started in hunting, but if you want to learn everything now, see if you can find a copy of *Transmitter Hunting: Radio Direction Finding Simplified* by Joe Moell, K0OV, and Thomas N. Curlee, WB6UZZ, published by TAB Books. This book is generally considered to be the T-hunting bible.

It doesn't take a lot of fancy, expensive equipment to get started hunting, but the more you participate, the more "toys" you'll want to get. Lucky for us, though, a lot of what you'll want and need can be built instead of purchased. No particular set-up works for every hunter, and what may seem to be the standard in one area isn't popular at all somewhere else. Every hunter has his or her own opinion of what works best, and that's great. But it makes it a little tough for the new hunter to figure out what to get first.

Directional Antennas—Where I live, everyone seems to start out with a directional quad, or beam, mounted on their car, and hooked up to a receiver with an S-meter. Most of these quads are homemade, and some of the mounting schemes these hunters have dreamt up are absolutely amazing. A lot of active hunters have drilled a hole in the roof of their car so that they can spin the antenna right there, (if you're really lucky, you have a sunroof so this can be avoided). Others have rigged up some sort of window mount, where the antenna sticks up from the passenger side. I've seen pickups with the antenna mounted in the bed of the truck. You stick your hand out the back window to turn it.

Gordon West, WB6NOA, demonstrates a "home-brew" two-meter cubical quad antenna made out of PVC irrigation tubing. This type of antenna is very popular for transmitter hunting. (WB6NOA photo)

Then, of course, there are the ingenious set-ups—the ones that give mechanical engineers nightmares. Some hunters rig up these complicated pulley systems for spinning the antenna, that only they know how to operate. Others have put an incredible amount of energy into exactly how to fit everything into their little compact cars. Depending on where you live, there may be regulations on how far things can stick out the top and/or side of the vehicle. Be sure you check into all the rules with your local Department of Motor Vehicles before you invest a lot of time, energy, and money into the installation.

If you're going to be hunting on 2-meters, a directional quad gets a little bulky to carry around when you get too close to keep driving and have to start hunting on foot. For those times, you'll probably want something called a homing DF. Homing DFs generally consist of a pair of antennas connected to a meter of some sort, or a pair of light-emitting diodes (LEDs), to tell you when the antennas are pointed in the right direction. Compared to a two-meter quad, a homing DF is relatively small and easy to carry.

The more extravagant option is the *doppler*. A doppler is a fairly small box that can easily be mounted permanently in a car. The box is connected to several antennas, and gives a direct readout of the direction it's getting the strongest signal from. Most dopplers give the readout by way of a ring of LEDs set up something like a clock, and one will light up telling you which direction the signal is coming from; (i.e. if the light at 12:00 is lit, the signal is coming from straight ahead). Dopplers are a little harder to build for most people, and they're noticeably more expensive to purchase, but they work great!

Finding The Fox—Depending on the rules you set up for your hunts, different equipment will make more sense for you. Some hunts have large boundaries, and signal strength can vary. Others have fairly narrow boundaries and a strong signal is always present. Also, one of the problems we have

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with our local hunts is *reflection.* We have hills and mountains all over, and tall buildings everywhere you look. All the above-mentioned DF gear tells you the direction where the strongest signal is coming from, *not where the transmitter is located.* It may be getting a good reading from the north, so you dutifully drive that way and find nothing. Actually the transmitter was south of you, and you were chasing a reflection off that mountain you've been staring at the whole time. Here in Orange County, we have our beloved "Baldy bounce" off of Mt. Baldy. Every now and then we'll get signals coming from Catalina Island off the coast. The more local hunts you go on, though, the more accustomed you'll become to these "tricks." When it's your turn to hide, you'll be able to use them to your advantage in fooling all the hunters.

I think the most important thing for a beginning hunter to realize is that all the reading in the world won't teach him much until he's actually gone out on a hunt. Whether you just ride along, read the maps or help spin the beam, you need to get out there.

That's the best bit of advice I can give you. Just get out, and start hunting. You'll be surprised how much fun it is! After most of our hunts here, we usually all meet at a restaurant or somewhere we can talk and exchange hunting horror stories. Those gatherings are a lot of fun, and you get to learn from everyone else's misfortune. After you've gone on a hunt or two, you'll have stories of your own to contribute to these talks.

So *get started!* Talk it up among your friends. Pick a date for an antenna party so you can all get together and build beams. Talk to some hams who have hunted before and see what they have to tell you. You've got all that radio knowledge stored up in your head—put it to use! Go make friends with the folks at your local hardware store . . . you've got some antennas to build!

CU next issue—
de Stacey, KD6NQE ❑

RS-10/11 PASSES FOR APRIL/MAY

AOS Time (UTC)	LOS Time (UTC)	AOS Time (UTC)	LOS Time (UTC)
1 Apr 93 12:31:54	1 Apr 93 12:49:43	1 May 93 21:02:42	1 May 93 21:20:06
1 Apr 93 23:37:55	1 Apr 93 23:55:19	2 May 93 08:41:26	2 May 93 08:58:49
2 Apr 93 13:02:08	2 Apr 93 13:19:38	3 May 93 09:11:16	3 May 93 09:28:55
3 Apr 93 00:07:53	3 Apr 93 00:25:27	3 May 93 20:17:02	3 May 93 20:34:45
3 Apr 93 11:46:50	3 Apr 93 12:03:57	4 May 93 20:47:12	4 May 93 21:04:29
4 Apr 93 12:16:24	4 Apr 93 12:34:13	5 May 93 08:25:49	5 May 93 08:43:18
4 Apr 93 23:22:23	4 Apr 93 23:39:52	5 May 93 19:31:41	5 May 93 19:48:49
5 Apr 93 12:46:43	5 Apr 93 13:04:05	6 May 93 08:55:46	6 May 93 09:13:21
5 Apr 93 23:52:24	6 Apr 93 00:09:54	6 May 93 20:01:29	6 May 93 20:19:13
6 Apr 93 11:31:14	6 Apr 93 11:48:30	7 May 93 20:31:42	7 May 93 20:48:51
7 Apr 93 12:00:53	7 Apr 93 12:18:43	8 May 93 08:10:14	8 May 93 08:27:47
7 Apr 93 23:06:51	7 Apr 93 23:24:24	8 May 93 19:16:05	8 May 93 19:33:23
8 Apr 93 12:31:20	8 Apr 93 12:48:31	9 May 93 08:40:17	9 May 93 08:57:46
8 Apr 93 23:36:55	8 Apr 93 23:54:20	9 May 93 19:45:57	9 May 93 20:03:41
9 Apr 93 11:15:38	9 Apr 93 11:33:02	11 May 93 07:54:39	11 May 93 08:12:15
10 Apr 93 11:45:24	10 Apr 93 12:03:11	11 May 93 19:00:29	11 May 93 19:17:56
10 Apr 93 22:51:19	10 Apr 93 23:08:55	12 May 93 08:24:48	12 May 93 08:42:11
11 Apr 93 23:21:26	11 Apr 93 23:38:45	12 May 93 19:30:24	12 May 93 19:48:07
12 Apr 93 11:00:03	12 Apr 93 11:17:34	14 May 93 07:39:05	14 May 93 07:56:43
13 Apr 93 11:29:55	13 Apr 93 11:47:39	14 May 93 18:44:54	14 May 93 19:02:28
13 Apr 93 22:35:47	13 Apr 93 22:53:26	15 May 93 08:09:20	15 May 93 08:26:35
14 Apr 93 23:05:58	14 Apr 93 23:23:08	15 May 93 19:14:52	15 May 93 19:32:33
15 Apr 93 10:44:28	15 Apr 93 11:02:04	16 May 93 06:53:56	16 May 93 07:10:56
15 Apr 93 21:50:26	15 Apr 93 22:07:32	17 May 93 07:23:31	17 May 93 07:41:10
16 Apr 93 11:14:27	16 Apr 93 11:32:07	17 May 93 18:29:18	17 May 93 18:46:58
16 Apr 93 22:20:16	16 Apr 93 22:37:55	18 May 93 07:53:53	18 May 93 08:10:59
17 Apr 93 22:50:30	17 Apr 93 23:07:31	18 May 93 18:59:20	18 May 93 19:16:57
18 Apr 93 10:28:55	18 Apr 93 10:46:34	19 May 93 06:38:16	19 May 93 06:55:26
18 Apr 93 21:34:51	18 Apr 93 21:52:07	20 May 93 07:07:58	20 May 93 07:25:36
19 Apr 93 10:59:00	19 Apr 93 11:16:33	20 May 93 18:13:43	20 May 93 18:31:28
19 Apr 93 22:04:44	19 Apr 93 22:22:23	21 May 93 18:43:48	21 May 93 19:01:20
21 Apr 93 10:13:22	21 Apr 93 10:31:04	22 May 93 06:22:37	22 May 93 06:39:55
21 Apr 93 21:19:17	21 Apr 93 21:36:40	23 May 93 06:52:25	23 May 93 07:10:02
22 Apr 93 10:43:33	22 Apr 93 11:00:59	23 May 93 17:58:09	23 May 93 18:15:57
22 Apr 93 21:49:13	22 Apr 93 22:06:50	24 May 93 18:28:17	24 May 93 18:45:42
24 Apr 93 09:57:49	24 Apr 93 10:15:33	25 May 93 06:06:59	25 May 93 06:24:24
24 Apr 93 21:03:43	24 Apr 93 21:21:13	25 May 93 17:12:47	25 May 93 17:29:58
25 Apr 93 10:28:07	25 Apr 93 10:45:25	26 May 93 06:36:53	26 May 93 06:54:27
25 Apr 93 21:33:43	25 Apr 93 21:51:16	26 May 93 17:42:35	26 May 93 18:00:24
26 Apr 93 09:12:40	26 Apr 93 09:29:47	27 May 93 18:12:46	27 May 93 18:30:03
27 Apr 93 09:42:17	27 Apr 93 10:00:01	28 May 93 05:51:22	28 May 93 06:08:52
27 Apr 93 20:48:09	27 Apr 93 21:05:44	28 May 93 16:57:10	28 May 93 17:14:32
28 Apr 93 10:12:42	28 Apr 93 10:29:49	29 May 93 06:21:22	29 May 93 06:38:52
28 Apr 93 21:18:12	28 Apr 93 21:35:42	29 May 93 17:27:01	29 May 93 17:44:51
29 Apr 93 08:57:02	29 Apr 93 09:14:18	30 May 93 17:57:15	30 May 93 18:14:23
30 Apr 93 09:26:46	30 Apr 93 09:44:28	31 May 93 05:35:45	31 May 93 05:53:19
30 Apr 93 20:32:36	30 Apr 93 20:50:15	31 May 93 16:41:33	31 May 93 16:59:03

LETTERS

RS-10/11

Dear Don:

I got the complimentary copy of the *Communicator* in late November and you got me hooked with the article on RS-10. I get the best signal when it passes over Memphis, TN because it's right on the 90° meridian and I'm approximately 26 miles east of 90°. One small goof—six feet of wire (per your article) won't quite get it! Five times 19 inches is closer to eight feet. I used 19.25" and it took just over eight feet. Maybe it was a typo error. By the way, the beacon has been sending an address for QSL and a very nice "Merry Christmas and Happy New Year" message. It signed "Op-Andy, 73 AR."

73 Ivan Hess, N0RAM/AG

Right, Ivan, it was a typo in the right-front occipital lobe of my brain!

Dear Don:

I am helping my son earn his Codeless Technician license. I think he will have 5 WPM by test time since he wants to follow my "radio trail—HI!" Thank you for your trial copy of the *Communicator*. It hit the eye of my 11 year old. Now he wants to read more! Here's my $10.00.

73 Bill Roy, K1YOR

Good luck to you and your son!

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THAT OLE MORSE MAGIC

Dear Don:

For thirty-six years I have not been able to learn code and participate in Amateur Radio. I have an audio-learning disability. This impairment has not prevented me from living a normal life. Amateur Radio is the only hobby I cannot have. The code-readiness requirement in case of war should have ended with WW II.

Robert West

Robert, apparently you have not heard about the Technician class license or the physical disability waiver. You no longer need to know the Morse code to get a ham license. And if you can get a physician's letter regarding your impairment, the Volunteer Examiners will waive the Morse code test and grant you Technician Plus, which gives you privileges on the HF bands.

Dear Don:

I am a Technician class ham. I don't key up much because I am considered a "teckie." I listen and enjoy ham radio a lot. I don't really know how to say this, but you have guts! I know the code, but I guess I'm not that smart. I can barely read above 3 WPM. Since I'm married with children, I don't have the time to devote to practice, but that's my fault. A place to practice on 160 meters would be great! No, you are not a crank—you are my hero. It's people like you that keep my hope up and thanks for fighting for us Techs.

David Hill, Jr.

Some guys sure know how to get their letter published in the Communicator!! <GRIN> Thanks for the kind words, David.

Dear Don:

The new codeless hams in my area are a compliment to ham radio. I have nothing but praise for them. I can still copy code over 40 WPM but I don't think, and never have, that code copying ability made any ham better than someone who didn't do well at it. I'm not worth a darn on a computer, HI HI.

73, James A. Gundry, W4JM

We see eye-to-eye, James.

Dear Don:

I'm still not very comfortable using my small 2-meter Alinco even though I get lots of encouragement from my husband Don, N4UTH, and I'm sure with time I will improve. My son David, N8HKY, became my teacher and encouraged me to take both the Novice and Technician test in June, which I did and passed. I thought you would like to know that I'm 78 years old and without the "no-code" would never have tried to become a ham.

Sincerely, Harriet Norris, KD4RLR

Harriet, I think that is wonderful... congratulations to you, your husband and your son. How about a photo for the Communicator?

BUT ON THE OTHER HAND

Sir:

Your position advocating more no-code frequencies on the Amateur bands is wrong. No-code licensing spells the end of Amateur Radio. If you don't believe it, come to Richmond and listen to the WD4s (most no-coders) on the two-meter repeaters here. For God's Sake forget any further backing of no-code!!

73 Randolph Owen, KA4TMT

Randolph, I'm surprised that someone with a Technician class license would take this position. Where would you be if we had listened to those dinosaurs in the '50s that predicted the end of ham radio with the introduction of the Novice and Technician license. And if Morse is the salvation of the world as we know it, how come you haven't upgraded to General? You've been a Tech for a looooong time. —Ed

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TO: Don Stoner, W6TNS
National Amateur Radio Assoc.

QSLing

(Continued from page 7)

it's probably fair to assume that a minimum of data for your own personal QSL card should contain the following:

1. **The reason**. Some notation of the *purpose* of the card. That is, that the card is "confirming two-way contact" or words to that effect. It wouldn't be an actual QSL card without that important distinction being clearly mentioned!

2. **A signal report**. Some awards require this, while others do not, but it's always a logical thing to include.

3. **The frequency**. This can be either in wavelength or in reasonably-accurate actual frequency. Again, some awards programs demand this information. And you might not know at the time that the person needing your confirmation of contact may some day need it for other purposes, based on the band or frequency. For example, a QSL card that includes the frequency, would be valuable, perhaps, for the *Worked All States* (WAS) certificate, and just as likely for the five-band *WAS*. But not if it didn't include the frequency, or at least the Amateur Radio band on which the contact took place. And some programs forbid Amateur Radio credit on certain bands, so it's usually a wise move to include the frequency, just so that there is no confusion, now or later.

4. **The mode of operation**. Here again, being specific is far better than being vague. Try to be considerate of what the Amateur receiving your QSL card may some day need your card for. Thus, stating RTTY is preferred over digital or F1B, and CW will be more valuable (and more accurate) than "Mode A" in the case of a satellite contact.

5. **The time and date** that the contact occurred. Remember, someone removed from you by as much as one time zone will be confused if you use your local time and date. *Always* indicate the time and date by using **Universal Coordinated Time.** It's not only a tradition—it's almost always an absolute necessity; One of the biggest reasons that a given QSL card is returned as "not acceptable" is because the card had the wrong date or time on it. Remember also that an Amateur can (in theory) work several *hundred* stations in an hour—especially during the more popular contests. Don't make life hard for them, give them the date and time in accurate Universal Coordinated Time. **Always**.

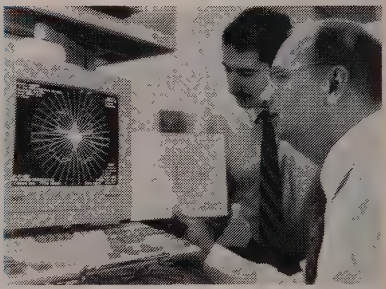
6. **Your callsign and his callsign**. A frequently-noted way of doing this accurately is having your callsign in large letters, followed by the words "confirming two-way contact with W6TNS"—or with whomever the other Amateur was. Leave no doubt as to the identity of either station, and always insure accuracy. If you make the card out to "W6*DNS*", you'll just have guaranteed that it'll never be used!

7. **The location**. In recent years (again because of the large number of awards available), it has become prudent to include your Maidenhead Grid Square, in addition to perhaps the county and the normal mailing address that you'd likely not forget to include anyway. Both county and grid-square chasing have become intense Amateur Radio sub-sports for operators all over the world. Include them both on your cards.

In an upcoming issue of *The Amateur Radio Communicator*, we'll be bringing you more information about the fine points of QSLing. We think you'll find these details to be not only informative and useful, but also very valuable toward the goal of increasing your enjoyment of the Amateur Radio Service. Take a look into QSLing—you'll be glad you did! ❑

HOT TIPS

Interested in antennas? Long-time supplier of Amateur antennas, **Antenna Specialists, Co.**, has just opened a new BBS loaded with technical information . . . not just advertisements! You can even download antenna patterns among other files that are available. If you have a modem, set it to an 8-bit word, no parity and one stop bit (8N1). The SYSOP is Andy Singer at 216-349-8400.



Antenna Specialists executives Andy Singer (left) and Al Dolgosh review pattern plot software downloadable from Antenna Specialists' RBBS.

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Join the National Amateur Radio Association

and receive . . .

The Amateur Radio Communicator!

Who Should Belong to the National Amateur Radio Association?

- Anyone interested in obtaining an Amateur Radio license
- New Amateur Radio operators of all classes
- Public and private school teachers who want to introduce their students to Amateur Radio
- Beginning Novice and Technician class Amateurs
- Elmers who want to assist beginners
- All Amateurs concerned about the future of the Amateur Radio Service

What Will You Gain when You Join NARA and Receive the *Communicator?*

1. Knowledge to help Novice and Technicians get the most from the Amateur Radio Service
2. You will help insure a solid future for the Amateur Radio Service and its frequencies
3. The knowledge that *you* will be helping others become involved in Amateur Radio.

This means an exciting future for you as an Amateur Radio operator!

Here's What You'll Find in the *Communicator!*

- Help passing the Amateur Technician Class exam
- Erecting your first antenna, propagation and more
- Different types of Amateur communications
- The latest details on rules and regulations
- Repercussions that government regulation changes will have on the future of Amateur Radio
- The latest news on proposed changes to the Amateur Radio Service
- News of interest to Novice and Technician operators
- Help upgrading your license class
- News and developments of particular interest to Novice and Technician class hams
- Pictures and news about other Novices and Technicians
- Hot Tips - news you need as an Amateur

NARA is the only national organization devoted to representing Novice and Technician class Amateurs!

What's NARA Doing?

The goals of NARA are to:

- Publicize Amateur Radio to the general public
- Get more young people involved in our hobby
- Prevent confiscation of Amateur spectrum and obtain additional allocations for Novices and Technicians
- Represent the interests of Novice and Technician class operators

Recently, Amateur Radio lost part of the 220-MHz band and, in some areas of the country, is in the process of *losing access* to another band (900 MHz).

NARA is striving to get more people involved in the Amateur Service so we can increase activity and retain our remaining Amateur bands.

When you join NARA, your membership dollars will be used to ***further these goals***. Let's face it—with a membership cost of only $10.00 per year, ***you won't find a better value in Amateur Radio!!!*** Join today! It's easy. Just complete the subscription form below and mail your check or money order. For the fastest service, call 1-800-GOT-2-HAM (1-800-468-2426) with your Visa or MasterCard number.

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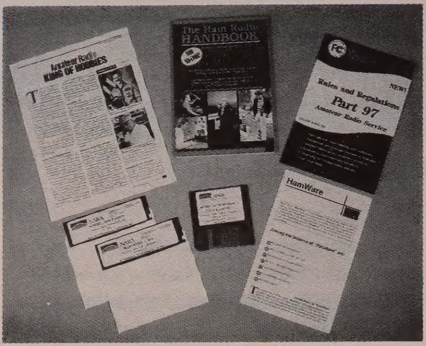
HOW DID I GET THIS MAGAZINE?

ONE OF THE WAYS WE CAN TELL THE WORLD ABOUT the goals and ambitions of the National Amateur Radio Association is to supply complimentary copies. We send about 10,000 pieces to newly licensed hams. This magazine is also mailed to a select list of people who might be interested in becoming Amateurs. We also send approximately 10,000 copies to NARA members and prominent people in Amateur Radio.

If your mailing label does not include a NARA membership number, this may be your last or only copy of *The Amateur Radio Communicator.* We would like to continue providing you with this informative publication, but we can only do so if you are a member of NARA. For those interested in becoming a ham, or who are newly licensed, a membership in NARA represents an outstanding bargain. A membership, which includes a subscription to *The Amateur Radio Communicator,* is only $10.00 per year.

Check the mailing label for your membership number. If you don't see one, look at the NARA advertisement and read the benefits of becoming a member of this fast-growing organization. We need your support and so does ham radio. Help us get it "going and growing!"

AVAILABLE FROM NARA



Pass the New Codeless Technician Test!

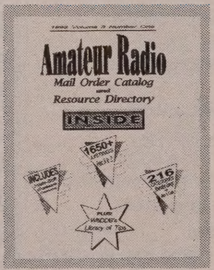
Everything you need to pass the new codeless Technician Class exam! The **NARA Codeless Technician Package** includes:

- *The Ham Radio Handbook*, the 200+page study guide that guarantees you'll pass the test or your money back!
- HamWare software for testing your knowledge
- FCC Amateur Rules and Regulations book
- Bonus Morse code training program (IBM) 0 to 25wpm
- Complete list of Contact Volunteer Examiners
- *King of Hobbies* publication, a special introduction to Amateur radio

The NARA Codeless Technician Package (IBM) is just $29.95 (3.00 S&H) #P110.

Having Trouble with Code?

The **Morse Academy,** IBM software, actually teaches all 43 required code characters and then steps you up through the Amateur Extra level using sophisticated computer aided instruction techniques. Adjustable tone, standard or Farnsworth spacing. Sends text or randomly generated characters—plus an on-disk manual! (5¼" disk) ***WAS* $14.95, *NOW ONLY* $9.95 ($1.50 S&H)** #S410.



NEW 1993!

Amateur Radio Mail Order Catalog And Resource Directory

Now bigger than ever! With **30 more pages, 30 new categories**, and over **150 more listings** it has never been a more valuable resource for your ham shack! You'll find everything from A to Z, including parts and equipment, kits and keyers, QSL cards, even personalized hats, mugs, and license plates. There's an extensive listing of radio clubs worldwide, international radio magazines, and over 100 free catalogs available just waiting to be requested!

Use it again and again as you reference products, clubs, catalogs, shareware and much, much more! The ***Amateur Radio Mail Order Catalog and Resource Directory* with 260 pages is only $14.95 ($3.00 S&H)** #B660.

HamWare™ Testing Software

The **HamWare,** IBM compatible (5¼" and 3½" disks) testing software, provides all the practice you need to get your first license or to upgrade. Drawings and diagrams appear automatically on screen along with the appropriate questions, and there's even a practice mode, complete with hints, answers and help screens. There's even a handy on-screen scientific calculator. Your choices are mouse or keyboard selectable. As a bonus, each disk includes a copy of **Morse** software for learning Morse code.

- HamWare Nov/Tech Classes w/Morse #S210
- HamWare General Class w/Morse #S211
- HamWare Advanced Class w/Morse #S212
- HamWare Extra Class w/Morse #S213

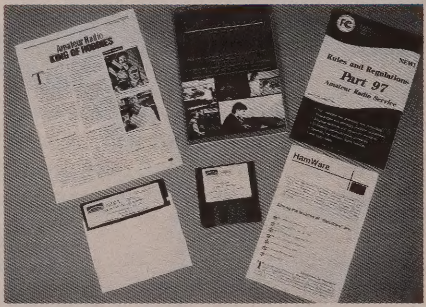
HamWare is available at Amateur Radio dealers or directly from NARA. License classes are sold individually. Each class is only **$14.95 ($2.00 S&H).**

NARA Amateur Training Package

Start with your Novice or no-code Technician license and go "all the way" to Extra class with this excellent IBM compatible training package that includes:

- HamWare Novice/Technician Classes w/Morse
- HamWare General Class w/Morse
- HamWare Advanced Class w/Morse
- HamWare Extra Class w/Morse
- 60-page *FCC Rules and Regulations, Part 97*
- *Amateur Radio—King of Hobbies*
- An extensive list of Contact Volunteer Examiners.

Save by ordering the **NARA Amateur Training Package.** This entire package (5¼" and 3½" disks) is only **$32.95 ($3.00 S&H)** #S220.



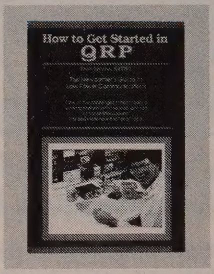
Upgrade to General Class with the NARA UPGRADE Package

NARA has put together all the essential tools you'll need to upgrade to General class. This value-packed offer includes:

- *UPGRADE! to General Class* by W6TNS
- HamWare General Class IBM (5¼" and 3½" disk) testing software w/Morse
- 60-page *FCC Rules and Regulations, Part 97*
- *Amateur Radio—King of Hobbies*
- An extensive list of Contact Volunteer Examiners

The **NARA Upgrade Package** is available at Amateur Radio equipment dealers or directly from NARA for only **$29.95 ($3.00 S&H)** #P240.

A **FREE** issue of ***The Amateur Radio Communicator*** will be mailed to you at a later date when you order any NARA product!



NEW! Introduction to QRP!

NARA does it again with its ***How To Get Started in QRP*** book. QRP (meaning low-power operation using five watts or less) offers a unique and exciting challenge for today's ham. Written by Dave Ingram, K4TWJ, "*QRP*" covers an overview of QRP, accessories, operating tips, power sources, homebrew, clubs, awards and more. With today's technology and equipment, working the world with QRP could be the ultimate challenge! ***How To Get Started in QRP*** is available at all major ham radio stores or directly from NARA for only **$9.95 ($2.00 S&H)** #B690.

MacHam™ Testing Software

MacHam is one of the most useful series of ham radio programs written for the "Mac." All required circuit diagrams are displayed with the question on the screen. If the test is printed, the diagrams are included.

The tests can be taken on screen, by element or by chapter, with options of immediate or end-test scoring. Printouts create exact VE style exams, with question pool numbers, correct and blank answer sheets.

- MacHam Nov/Tech #S310 **$39.95 ($2.00 S&H)**
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- MacHam Advanced #S312 **$29.95 ($2.00 S&H)**
- MacHam Extra #S313 **$29.95 ($2.00 S&H)**

Pass the Codeless Technician Test with the MacHam™ Education Package

The **MacHam Education Package** includes:

- MacHam Novice/Technician Class Software
- *Ham Radio Handbook*, by Donald Stoner, W6TNS
- Ham radio *FCC Rules and Regulations, Part 97*
- *Amateur Radio—King of Hobbies*
- An extensive list of Contact Volunteer Examiners

Order direct from NARA today. **The MacHam Education Package** is only **$49.95 ($3.00 S&H)** #P320.

Upgrade to General with the MacHam™ Upgrade Package

If you want to upgrade to General Class, you need the **MacHam Upgrade Package** which includes:

- MacHam General Class software
- *UPGRADE!* book by Donald L. Stoner, W6TNS
- Ham radio *FCC Rules and Regulations, Part 97*
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- An extensive list of Contact Volunteer Examiners

The **MacHam Upgrade Package** is only **$44.95 ($3.00 S&H)** #P340.

Learn the Code with these Outstanding Cassette Tapes!

These cassette tapes will give you the practice you need to pass your code exams. Each set contains two cassette tapes. Each set sold separately.

- Novice/Technician Class 0 to 5wpm #T710.
- General Class 5 to 14wpm #T720.
- Extra Class 12 to 24wpm #T730.

Order today for only **$11.95 ($2.00 S&H).**

For The Fastest Service, Call NARA At 1-800-GOT-2-HAM (1-800-468-2426)

AVAILABLE FROM NARA

How To Earn Your No-Code Ham License

By Don Stoner, W6TNS, is the leading book for anyone wishing to earn the new code-free Tech license. Includes every question plus the multiple-choice answers.

How To Earn Your No-Code Ham License is the only test manual that includes simple and easy-to-understand theory along with many photos and illustrations.There are ten chapters covering each subelement. Sample tests are given at the end of every chapter with a list of correct answers at the back of the book.Guaranteed to provide all the information needed to get your ham radio license or your money will be refunded. ***How To Earn Your No-Code Ham License*** is only **$9.95 ($2.00 S&H)** #B610.

FCC Rules and Regulations

The FCC, Rules and Regulations Part 97, covers the guidelines and rules of the Amateur Radio service. This 60+ page book is an excellent reference for every class of license; a resource book no ham shack should be without! ***Rules and Regulations, Part 97, Amateur Radio Service*** is only **$4.95 ($1.00 S&H)** #B640.

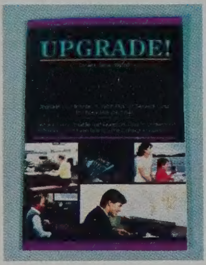
All About Ham Radio

This is the book that Don Stoner wishes he had written. Harry Helms, AA6FW, wrote this book in a manner that can be understood by everyone from young to old alike. Although not keyed directly to the question pools, it provides all the information you need to know to become a Technician Class Amateur.

Over 290 pages of jam-packed information including Hams And Their Radios, Customs, Habits And Other Good Stuff, Single Sideband, Ham Radio Meets the Personal Computer, Folklore, and much more.

For a book that covers so many different aspects of the Amateur radio hobby ***All About Ham Radio* is a steal at only $19.95 (3.00 S&H)** #B680.

Order Today!



UPGRADE!
To The Tech-Plus and General Classes!

UPGRADE to General Class by W6TNS shows "no-code" hams how easy it is to upgrade to the Tech-Plus or General Class license!

UPGRADE! has nine chapters covering each subelement of the General Class exam. All multiple-choice questions and answers for the General Class exam are included. Tips and special hints for learning the code and increasing your speed are also included!

UPGRADE! is available from Amateur Radio stores, or direct from NARA for **$9.95 ($2.00 S&H)** #B620.

Play It Up! With NARA's New Videotapes

Explore Amateur Radio through exciting videotapes! Directed by some of the best-known names in ham radio, these videotapes are the perfect addition to every ham's collection. Choose from the following:

Getting Started In Ham Radio. Covers the early stages of ham radio including station layouts, safety, choosing and setting up equipment and repeaters. By *CQ Videos*, **only $19.95 ($3.00 S&H).**

Getting Started On Amateur Satellites. A "how-to" guide for the newcomer wanting to work the world through Amateur satellites. Discusses equipment, DXing and more. By *CQ Videos*, **$19.95 ($3.00 S&H).**

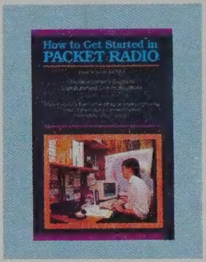
Getting Started in Packet Radio. A "how-to" guide to setting up a computer-to-computer station, getting on the air, QSOs, and operating packet effectively. By *CQ Videos*, **only $19.95 ($3.00 S&H).**

Getting Started in DXing. Successful DXers offer their tips on getting started, proper operating skills, snaring the rare ones, basic equipment and more. By *CQ Videos*, **only $19.95 ($3.00 S&H).**

Reading, 'Riting and Radio! Great for teachers and instructors, educator Carole Perry, WB2MGP, with her students and ham radio classes for children shows how beneficial and exciting ham radio is in school for teaching geography, world affairs, current events, math and more. **Only $19.95 ($3.00 S&H).**

CQ Field Day! Designed to help hams who want to set up their equipment in the great outdoors, this tape takes you to the award-winning 22A Field Day station. It shows you everything from setting up to packing up an outdoor radio station. **Only $19.95 ($3.00 S&H).**

Ham Class. Well-known instructor, Gordon West, WB6NOA, helps prepare students and instructors to set up a ham class. The tape contains live classroom demonstrations and tips on setting up classes or training seminars. **Only $19.95 ($3.00 S&H).**



NEW!

Packet Radio For Beginners

NARA has done it again with ***How To Get Started In Packet Radio*** written by well-known author Dave Ingram, K4TWJ. This informative new book explains the practical side of packet radio in a simple-to-understand manner. It begins with a non-technical description of packet radio, followed by chapters including *Getting Started, Setting Up Your Station, Operating Packet to Networking* and *HF Operation.* There is even a *Packet Radio Equipment Survey* and an appendix that includes circuits for interfacing equipment! Get ***How To Get Started in Packet Radio* today for only $9.95 ($2.00 S&H).** #B670

ATV Secrets For Aspiring ATVers

ATV Secrets For Aspiring ATVers, written by Henry Ruh, KB9FO, contains everything you wanted to know about **Amateur Television (ATV).** All ham licensees can participate in ATV—*even those with the new no-code license!* Amateur TV is fun and exciting. Take your own home video productions, make new friends and get more enjoyment from your video equipment. Hams should be *seen* as well as heard!

ATV Secrets is available through all major Amateur Radio equipment stores, or direct from NARA for only **$7.98 WAS $9.98 ($2.00 S&H)** #B630.

The FCC Question Pools—

Each booklet contains all the questions and answers for each license class. Does not contain explanations. Order your booklet by license class.

- Novice and Technician classes together (all the questions for the new code-free Technician class license) **$4.95 (S&H $1.50)** #B650.
- General Class **$3.00 (S&H $1.00)** #B651
- Advanced Class **$3.00 (S&H $1.00)** #B652
- Extra Class **$3.00 (S&H $1.00)** #B653.

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You can travel light but still enjoy powerful performance with Kenwood's TH-78A (144MHz/440MHz), TH-28A (144MHz) and TH-48A (440MHz) handheld transceivers.

- **Built-in DTSS & paging**
- **Alphanumeric memory**
- **Alphanumeric message paging**
- **Full-duplex cross-band operation (TH-78A)**
- **Semi-duplex cross-band operation (TH-28A/48A)**
- **Wideband receiver coverage, including AM receive on the aircraft band**

- **Dual-frequency receive**
  The TH-78A offers full-duplex cross-band operation and can receive two frequencies simultaneously—even on the same band (VHF+VHF or UHF+UHF). The single-band transceivers feature dual-band receive—the TH-28A also receives on the 440MHz band, and the TH-48A also receives on the 144MHz band—thus enabling semi-duplex cross-band operations (TH-28A↔TH-48A).
- **Multi-function memory channels**
  The TH-78A has 50 memory channels (expandable to 250 with the ME-1 option), while the TH-28A and TH-48A each have 40 channels (expandable to 240 with the ME-1 option).
- **Multiple scan options**
  You can choose from 8 different types of scan for each band, plus 2 scan stop modes—carrier-operated and time-operated.
- **Built-in DTSS & paging**
  The DTSS function allows DTMF access to the transceiver: the squelch is opened only when the appropriate 3-digit code has been received. The pager responds to a 7-digit DTMF tone group, indicating the caller's identity on the display.
- **Alphanumeric memory**
  Alphanumeric data (max. 6 characters) can be entered directly into memory.
- **Alphanumeric message paging**
  Alphanumeric messages can be stored in memory for immediate transmission. Up to 10 messages are stored in memory for recall when needed.
- **Battery-saving features**
  Auto power-off and auto battery saver functions help maximize operating hours.
- **Choice of accessories**
  A full line of chargers, speaker/mics, battery packs, and other accessories is available. See your authorized Kenwood Amateur Radio dealer for details!

TH-78A/28A/48A

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